STRUCTURAL EVOLUTION OF A PROCUREMENT COMMAND: A LONGITUDINAL STUDY OF STRUCTURAL DIFFERENTIATION

Michael Tanner

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

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A LONGITUDINAL STUDY OF
STRUCTURAL DIFFERENTIATION

by

Michael Tanner

March 1975

Thesis Advisor: W.J. Haga

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Structural Evolution of a Procurement Command: A Longitudinal Study of Structural Differentiation		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis; March 1975 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Michael Tanner		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		12. REPORT DATE March 1975 13. NUMBER OF PAGES 69
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Percentile role differentiation indicator
Organization size and complexity
Structural differentiation
Structural evolution
Role differentiation
Organizational sociology
Organization growth and decline

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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(20. ABSTRACT CONTINUED)

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Structural Evolution of a Procurement Command: A Longitudinal Study of Structural Differentiation

by

Michael Tanner
Lieutenant Commander, United States Navy
B.S., University of New Mexico, 1963

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
March 1975

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Eight years in the evolution of a procurement command were studied to determine the effect of organization size on structural differentiation across time. The Moore and Haga percentile role differentiation indicator was examined for its utility in measuring structural differentiation. The results indicated that growth and decline were not symmetric and that the direct output labor component remained approximately constant in size during decline while the other components shrank. The percentile role differentiation indicator was found to have both theoretical and practical value as a measure of structural differentiation.

TABLE OF CONTENTS

I. INTRODUCTION

A. BACKGROUND

Recent research into the formal dimensions of organization structure has emphasized mathematical modeling of the relationship between size and complexity. The preponderance of the current work, however, has used cross-sectional data rather than time series data that would consider growth as a process. Starbuck (1965) emphasized the necessity for time series studies of the growth of organizations:

> "...If a few people will commit themselves to build formal models, to collect detailed time series data on individual organizations over several years, and to confront models with data in a rigorous way ... the beginnings of a general theory will appear."

B. LITERATURE ON SIZE AND STRUCTURAL DIFFERENTIATION

1. Cross-sectional Studies

Hall (1967) suggested that size may be irrelevant as a factor in determining structural differentiation because he found that complexity could not be predicted from organization size.

Blau and Schoenherr (1971), in a more recent study based on cross-sectional data, found that a logarithmic transformation of size, as measured by total numbers employed, resulted in linear correlations with measures of structural differentiation.

Freeman and Hannan (1974), in reviewing the literature on the relationship of administrative intensity and size, found that cross-sectional research inherently assumed a symmetric relationship between growth and decline.

A problem with cross-sectional studies is that data collected at a single point in time on various sizes of organizations result in synthetic growth curves. Growth is a dynamic process and may not be adequately represented by size ordered sets of static measurements.

2. Time Series Studies

Tsouderos (1955) found that, during organization growth, changes in administrative employment were positively associated with changes in size, while during periods of organization decline they were negatively associated with changes in size.

Haire (1959), in a longitudinal study of four industrial firms, related size and complexity. His theoretical model was an organismic one that emphasized growth as a process and using this biological model he was able to fit longitudinal data into simple mathematical models.

Hendershot and James (1972), in a two point time series study, found a negative relationship between size and the administrative-production (A/P) ratio.

Moore (1974), in summarizing the literature on size and structural differentiation, indicated that the primary defect in both time series and cross-sectional studies was

the lack of data based upon studies that encompassed more than two time points.

3. Mathematical Models

Blau (1970) developed a mathematical model of the relationship between size and structural differentiation. Major theoretical propositions generated by this model were that role differentiation was (a) a monotonically increasing function of size while (b) the rate of increase was a decreasing function of size.

Mayhew et al. (1972) proposed an algorithm that generated all logically possible values of role differentiation for varying sizes of organizations while holding constant all other variables influencing a role structure.

Specht (1973), in examining the baseline model of Mayhew et al. (1972), found that it was based upon an assumption that limited the model to hierarchical organizations.

Moore and Haga (1975) proposed algorithms that generalized the size-role differentiation models under different assumptions about the skill uniqueness of organization members and the uniqueness of organization roles.

C. OBJECTIVE

This study investigated the managerial utility and theoretical value of the probabalistic baseline generator developed by Moore and Haga (1975). Data on structural variables were gathered from archives of an U.S. Navy procurement command.

The objective was to examine the relationship between size and structural differentiation over the life span of an organization to determine the usefulness of Moore and Haga's probabalistic percentile role differentiation indicator (PRDI).

II. METHODOLOGY

A. THE SAMPLE

The data was gathered from the headquarters of the Naval Ordnance Systems Command, Washington, D.C. (NAVORD). The Bureau of Naval Weapons, which represented an amalgamation of the Bureau of Ordnance and the Bureau of Aeronautics, was disestablished in 1966 and two separate commands, Naval Air Systems and Naval Ordnance Systems Command were created in its place. In May 1966, NAVORD became responsible for the acquisition and maintenance of surface and underwater ordnance. This arrangement lasted for eight years. In July 1974, NAVORD was merged with Naval Ship Systems Command to form Naval Sea Systems Command (NAVSEA). This study encompassed the growth and decline of NAVORD across its eight year life span. The organization was staffed by naval officers and civil servants. NAVORD's procurement tasks are now performed by its successor, NAVSEA. A sample of one organization across eight years limits the generalizability of the findings. This was necessary, however, within the economics of an exploratory study.

B. DESIGN OF DATA COLLECTION

The NAVORD organization manual, including changes, and telephone directories provided most of the data on structural variables. Additional data were found in the "plans of the day" published by NAVORD. Organization charts developed from

ls data were verified with management people in NAVSEA who
l formerly worked in NAVORD. Further details on structure,
laries, and funding were collected by the author during a
ır of duty (1971-1973) at NAVORD. This participant-observer
vantage insured that structural indicators derived from
ganization charts and other archival data accurately repre-
ıted the reality of NAVORD.

Organization charts of NAVORD were constructed for each
ar. A list of roles in this organization was prepared for
ch year indicating the number of people in each job.

ANALYSIS STRATEGY

Moore and Haga (1975) examined the role differentiation
an organization using two variables:

s = size (number of employees)
k = number of roles

mming over all possible arrangements of s persons in k roles
elded the number of ways of assigning people to roles.
ore and Haga developed five general assumptions about the
iqueness of roles and people. NAVORD fitted Assumption V,
at roles are interchangeable and people are interchangeable.
ople are interchangeable if individuals switch positions
d do not cause a new valid organizational arrangement.
les are interchangeable when a new ordering of roles does
t produce another valid way of organizing. A basic assump-
on of this algorithm is that within a role people are al-
ys interchangeable. Using these assumptions, the number
ways of assigning s people to k roles is:

$$N_{\underline{s}}^{(\underline{k})} = \left[\frac{\underline{k}(\underline{s}-\underline{k})}{(\underline{k}!)^2} \; u_{\underline{k}-2}^{(\underline{s})} \right] + 1$$

ere the braces denote the integer part of the value enclosed
d $u_L^{(\underline{s})}$ is an Lth order polynomial in $\underline{s}$ as described in the
chnical report of Moore and Haga (1975). This function gen-
ates a table of probabilities, $p(\underline{k},\underline{s})$. Moore and Haga
ated that a way of assessing the structural differentiation
a given organization was by noting the probability that
could have fewer than $\underline{k}$ roles:

$$M_1(\underline{k},\underline{s}) = \sum_{\underline{i}=1}^{\underline{k}-1} p(\underline{i},\underline{s}) = P[K < \underline{k} | \underline{s}]$$

ere $M_1(\underline{k},\underline{s})$ is the percentile indicator of role differen-
ation ranging from 0% to 100%. The percentile role differ-
tiation indicator (PRDI) was constructed in such a way that
did not vary with the size of the organization. The rela-
ve complexity of organizations of different sizes can be
mpared according to their respective PRDI because they in-
cate how much of an organization's empirical complexity is
e to variables other than size alone. In this study, the
DI measured role differentiation where roles were defined
particular jobs within the organization, such as secretary
project engineer. Size was measured by the number of
sitions and a position was defined as a person occupying a
rticular role.

PRDI values were calculated for the total size and associated number of roles of NAVORD for each of its eight years. A conventional administration-production ratio was calculated for each year as:

$$A/P = (L+S+C)/D$$

where

A/P = ratio of administrative personnel to production personnel

L = number of line management positions

S = number of staff positions with no line management responsibilities

C = number of clerical positions

D = number of direct output positions

Distinctions between line and staff segments of NAVORD were made with the organization's own line and staff codes contained in its command history. Direct output positions were defined here as line coded jobs that (a) exercised no supervision and (b) were involved with the design and acquisition of naval ordnance from defense contractors.

The strength of association between the PRDI and A/P ratios, as well as other structural and financial variables were examined by multiple regression analysis.

Since the sample was small the significance of differences between correlation coefficients was assessed with the t-test

(Chambers 1952) which provided the power needed for small samples. When the sample was split into growth and decline periods, the degrees of freedom decreased to the point where the relationships implied, although statistically significant, could not be relied upon to exist. This lack of reliance occurred when r had to be greater than .997 to be significant for P = .05. The degrees of freedom decreased for two reasons: (a) the mode was used to determine that there was both growth and decline, using the mode of a data set decreases the degrees of freedom by one, and (b) the number of observations dropped to four during growth and to six during decline. An element of caution must be introduced in any interpretation of the results since some of the correlations may be spuriously significant because of the over-analyzing of limited data.

III. EMPIRICAL FINDINGS

A. ARCHIVAL DATA

To test that archival data were an unbiased estimate of the actual organization parameters, a comparison of means test was made between the data on size from (a) the basic archives and from (b) payroll data. The number of paid salaries was obtained independently of the archival data from a former NAVORD employee, now in NAVSEA, who had been responsible for submitting periodic reports on General Schedule employee grade levels. This relationship is shown in Figure 1. With $n = 9$, the comparison of means test results were $t = -1.43$ and $F = -.36$ indicating less than a 5% chance that the archival data on size, and the payroll data on size could have been from different organizations.

B. GENERAL OBSERVATIONS

The structural evolution of NAVORD consisted of two major periods. From 1966 to 1969, the organization expanded rapidly at first and then slowly approached its greatest size of 1275 people. From 1969 to 1974, the organization shrank rapidly because of a Reduction In Force (RIF), equivalent to a civilian layoff, required by the Revenue and Expenditure and Control Act of 1968 that returned all federal organizations to the employment levels of 30 June 1966. This period of decline was not one of uniform shrinkage; the reaction to the RIF had tapered off by 1970 and NAVORD remained at approximately the

same size until 1972 when decline set in once again and continued until NAVORD was merged with NAVSEA in July 1974. Table II contains the annual figures for each of the periods and Appendix B includes the archival data collected on the organization for its total life.

Analysis of empirical correlations of size and role differentiation data, Table I, revealed statistically significant differences over time. The growth process and subsequent decline were not mirror images of each other. The percentage of line management, staff, direct output, and clerical positions remained approximately steady during both growth and decline as can be seen from Figure 3. During growth, the number of line management and direct output positions grew faster than the number of staff positions as shown by an examination of the slopes of the lines in Figure 2. During decline, the number of direct output positions remained approximately steady while the number of line management and staff positions declined, Figure 2.

C. PERCENTILE ROLE DIFFERENTIATION INDICATOR

The percentile role differentiation indicator (PRDI), for the period 1966-74, Figure 4, was related, in a statistically significant way, to the number of roles ($r = .89$); to time ($r = -.84$), and to the number of assigned military personnel ($r = .71$). The relationship between PRDI and size was not statistically significant ($r = .19$) nor was it related to the A/P ratio ($r = -.01$).

During growth (1966-69) PRDI was not signficantly related to any other variable but during decline (1969-74) it was related to average GS grade level ($r = -.81$) and to the number of roles ($r = .94$).

D. ADMINISTRATION-PRODUCTION RATIO

The A/P ratio, for the period 1966-74, was found to be negatively related, in a statistically significant way, to the number of line management positions ($r = -.72$); to the number of direct output positions ($r = -.95$); to size ($r = -.71$); to the number of staff roles ($r = -.72$); to the Operation and Maintenance (O&MN) funds available ($r = -.72$); to the procurement (OPN) funds available ($r = -.92$), and to the total funds available to NAVORD ($r = -.92$). O&MN funds are a category of funds in the federal budget which are used to operate and maintain naval forces. OPN funds are a category of procurement funds in the federal budget which are used for the procurement of production quantities of naval ordnance. The total funds available to NAVORD were figures representing the sum of O&MN + Headquarters Overhead + OPN - civilian salaries. The relationship of A/P ratio to size was also statistically significant ($r = -.71$) but the relationship to time was not significant ($r = -.09$).

During the growth period (1966-69) the A/P ratio was only significantly related to chief executive span ($r = 1.00$), but during the period of decline (1969-74), a statistically significant relationship was found with the number of direct output roles ($r = -.92$).

IV. IMPLICATIONS

The purpose of this study was to examine the effect of organization size on structural differentiation across time in a large bureaucracy. The utility of the percentile role differentiation indicator compared to the conventional A/P ratio was also examined.

A. SIZE AND STRUCTURAL DIFFERENTIATION ACROSS TIME

As measured by the PRDI, increasing size generated no increase in complexity and decreasing size was accompanied by a decrease in complexity which only had a 5% chance of occurring because of changes in size alone. Cross-sectional studies inherently assumed a symmetric relationship between growth and decline, Freeman and Hannan (1974) and when this assumption was confronted with time series data on a single organization over an eight year life span, the empirical results did not support a symmetrical relationship.

The more rapid growth of line management and direct output positions as compared to staff positions was a result that supported the conventional wisdom that the staff portion grows more slowly than the output oriented portion of an organization. Contrary to expectations from the organizational growth literature, the direct output component of NAVORD remained approximately steady during the decline while the line management and staff components shrank. The interesting result here was that complexity was decreasing as size decreased, as shown

by the PRDI, which meant that the number of roles must also have been decreasing, since the PRDI was invariant with size, and at the same time that size was decreasing an individual component of size was remaining constant. The component which remained constant was the number of direct output positions. This implied that the conventional wisdom that the staff component is most resistant to decline, Haire (1959), was not supported by the results of this study.

The forces which affected NAVORD during decline were different from those that affect industrial firms. Civil Service rules and regulations inhibit the attrition process in federal bureaucracies, impeding it in quite different ways from those experienced in industry. Appendix A presents a deatiled discussion of the attrition process in the Department of Defense. A deliberate effort was made by NAVORD executives to mitigate the effects of the attrition process by limiting RIFs to the one in 1969-1970, by using hiring restrictions, by encouragement of early retirement, and by imposing grade level restrictions on all elements of the organization. These measures led to retirement of supervisory personnel from both line and staff codes with the most seniority, to the absorption of specialized roles into more general ones, and to a lessening of structural differentiation as indicated by the declining number of roles, the shrinking of the A/P ratios and most clearly by the smaller PRDI during the period of decline. During the years 1969-1974 when NAVORD was declining, there

was a tendency for workers to lose their bosses while picking up his work in addition to their own without being promoted. This was especially true at retirement time each June.

Empirical results indicated that the percentage of line management, staff, direct output, and clerical positions (Figure 3) remained approximately steady through periods of both growth and decline. The almost flat slope of these curves gave the impression that the organization remained at the same level of complexity throughout its life as indicated by the constant percentages for line management, staff, direct output and clerical positions. However, an examination of the PRDI (Figure 4) showed that this was not the case. Structural differentiation varied across time.

B. UTILITY OF THE PERCENTILE ROLE DIFFERENTIATION INDICATOR

The percentile role differentiation indicator was not expected to correlate with size if the measure was an orthogonal, i.e. size invariant, indicator of differentiation. Empirical correlations ($r = .19$) showed that the PRDI values were not a function of size. The A/P ratio correlated negatively ($r = -.71$) with size.

The PRDI exhibited a negative relationship ($r = -.84$) with time while the A/P ratio did not ($r = -.09$). The annual PRDI values were different enough to suggest that structural differentiation was not constant across time.

When the periods of growth and decline were examined separately the PRDI related with the number of roles ($r = .94$)

during decline. This repeated the relationship (r = .89) found for the overall life span. Since the PRDI was developed using the number of roles as an entering variable, the relationship with number of roles was expected. Several other statistically significant correlations were found but they did not echo similar relationships found with the complete life cycle and were thus considered to be statistical artifacts of over-worked data.

The lack of correlation (r = -.01) between PRDI and A/P ratio supported the notion that the PRDI was tapping a different dimension of organization reality. The PRDI had a baseline for the effect of size alone while the A/P ratio is open to influences of unknown variables. If the user wanted to see if an organization had become more or less complex for its size, then PRDI would indicate that, but the A/P ratio would not. A PRDI greater than 0.5 meant that the organization was more complex than size alone would dictate for this assumption and begged the question - what were the other variables besides size making it more complex. If the PRDI was constant then the effect of size was constant but if it varied then effects of other variables were coming and going from time to time. What other variables and when are the questions.

From a theoretical viewpoint, when size and the number of roles increased structural differentiation was greater, PRDI = 96.82 to 95.82 during the growth period 1966-69, Table II, and when size and the number of roles decreased

it was less, PRDI = 95.82 to 74.22 during the decline period 1969-74, Table II. This result supported Blau (1970) since the number of roles equaled complexity for Blau. Mayhew et al. (1972) developed a proposition from their baseline generator which also stated structural differentiation was a monotone increasing function of size. This proposition was not generated by the empirical results of this study.

At a practical level the PRDI is of more use to a manager than a conventional indicator such as the A/P ratio. The PRDI tells a manager where his organization's role differentiation stands in comparison to the logically possible complexities for its size. For instance, a PRDI value of 96.82 means that 96.82% of the organizations of, say, size 866 would have less than 147 roles as a result of size alone according to a distribution of all the logically possible arrangements of s people in k roles. If a manager compared the number of roles in his organization to its size on a periodic basis, he would be able to tell from PRDI values whether it was staying at the same level of complexity. Haire (1959) proposed that organizations grow in those areas where most threatened by either lack of internal resources, such as line managers unable to cope with specialized tasks in purchasing, or in the area of providing information for control and coordination. An alternative formulation is that the complexity of an organization is a reflection of the organization's response to its environment. A manager who

wished to model the possible effects of growth and decline in the size and/or number of roles of his organization could employ a sensitivity analysis using the PRDI as an indicator of complexity. The goal would be to match the complexity with the environment using historical data on appropriate levels of complexity for given environments.

The A/P ratio does not allow a managerial user to relate A/P ratio values to any baseline. There are no standard industry A/P ratios nor are there any for government bureaucracies. An A/P ratio involves the researcher and the manager in taxonomical problems. The organization must be categorized into line management, staff, direct output, clerical and other groupings to permit calculation of the A/P ratio. Taxonomical consistency with differing observers is problematic. The PRDI does not suffer from this problem since measurement of size and total number of roles do not depend on consistency in taxonomy.

V. CONCLUSIONS

The study of a large federal bureaucracy across time indicated that growth and decline were not symmetric. The conventional wisdom that the staff portion remains as a residual while direct output labor shrinks in a declining organization was not supported by this study. The utility of studying an organization through growth and decline across time, as suggested by Starbuck (1965) was supported by the results of this study in that time series data showed growth and decline as processes. When these processes were examined the assumption of symmetry in an organization's growth and decline inherent in cross-sectional studies seems to be false. By confronting a cross-sectional model with time series data theory has become more general by the challenging of the assumption of symmetrical growth and decline.

The percentile role differentiation indicator proposed by Moore and Haga (1975) was found to be invariant with size and both theoretically and practially useful as a measure of structural differentiation. Read across time, a series of PRDI values for an organization tells the effects of variables other than size on a growing/declining organization's complexity. In cross-sectional analysis, PRDI values remove the logical effects of size alone on the complexity of a set of organizations of similar size.

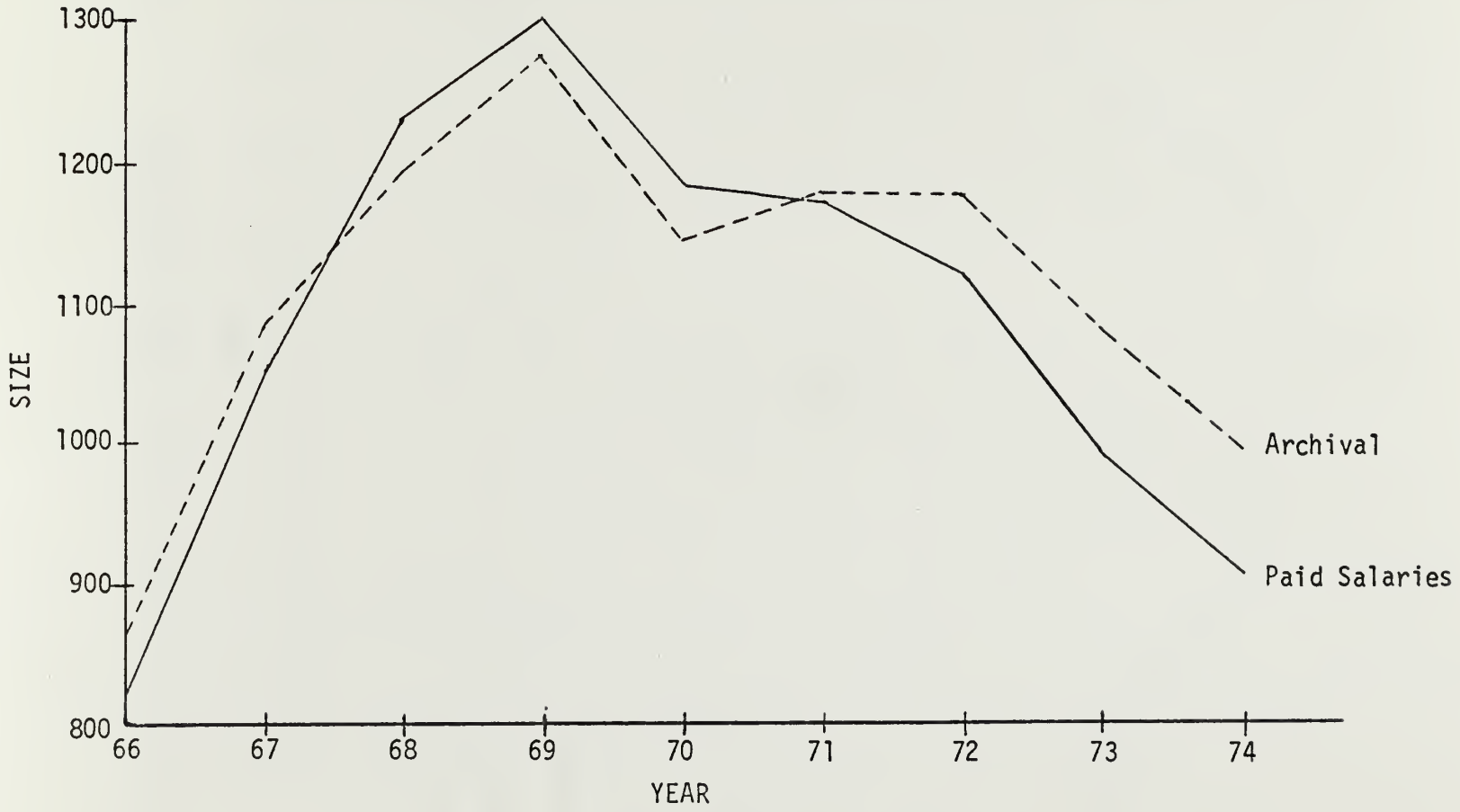

Figure 1. Archival Data and Number of Paid Salaries Across Time

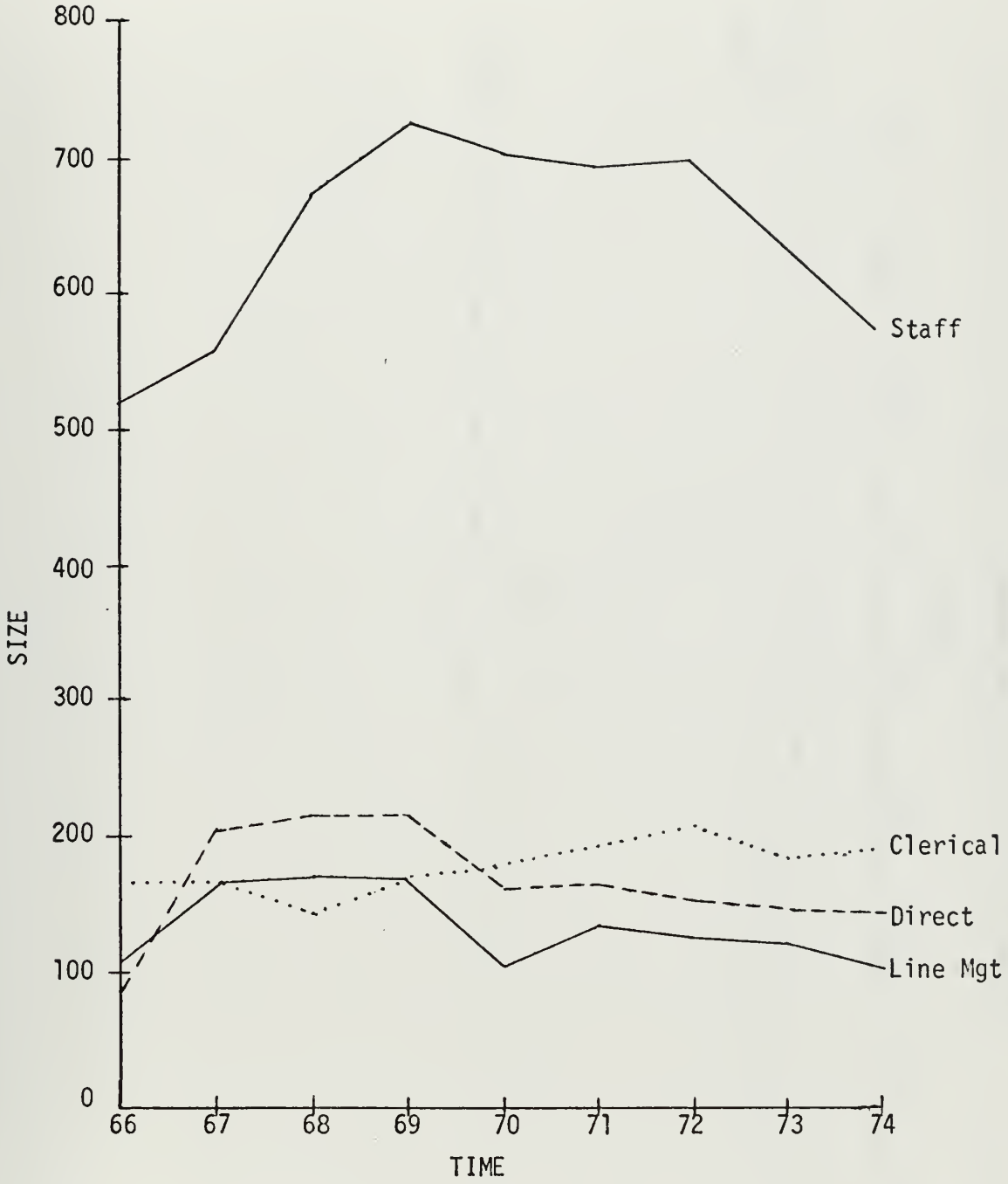

Figure 2. Line Management, Staff, Direct and Clerical Positions x Time

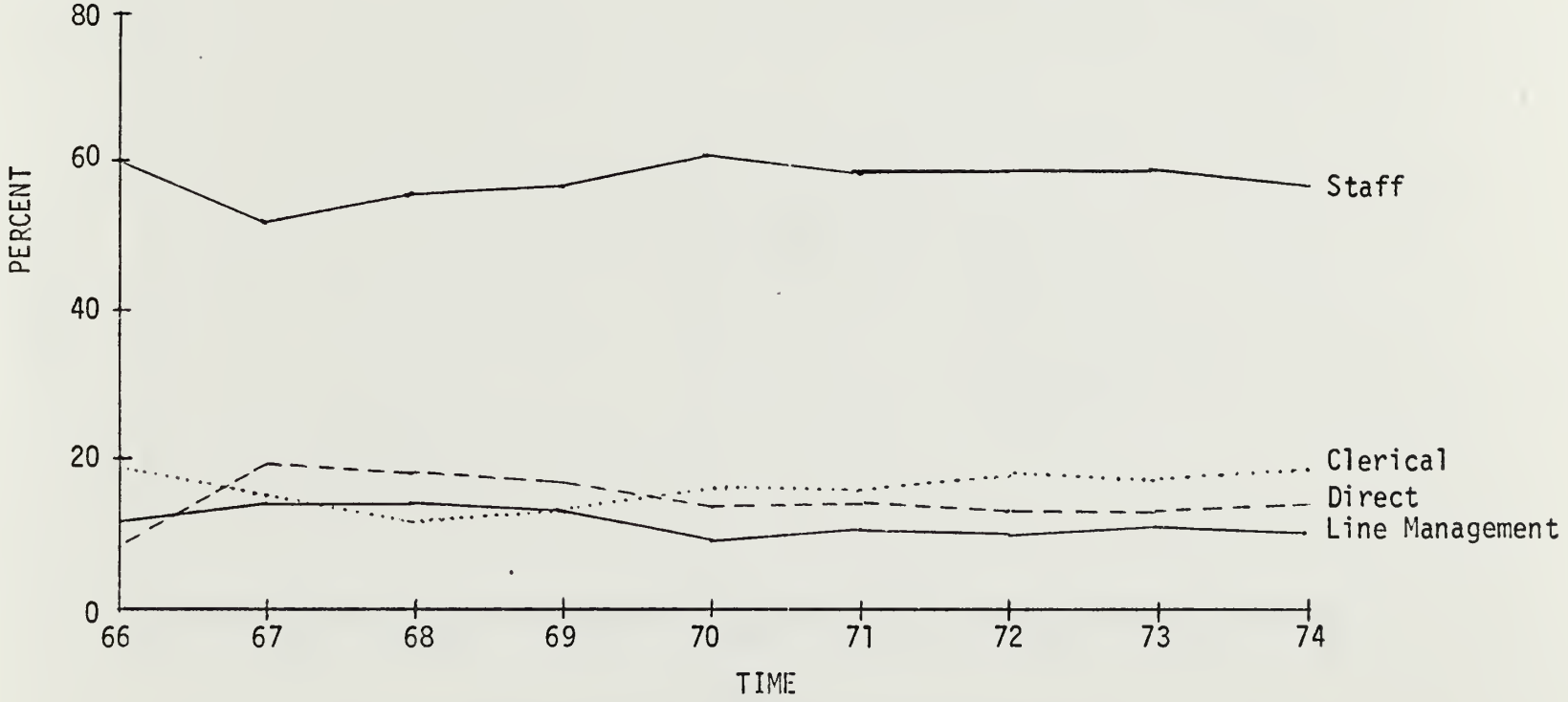

Figure 3. Percentage of Line Management, Staff, Clerical and Direct Positions x Time

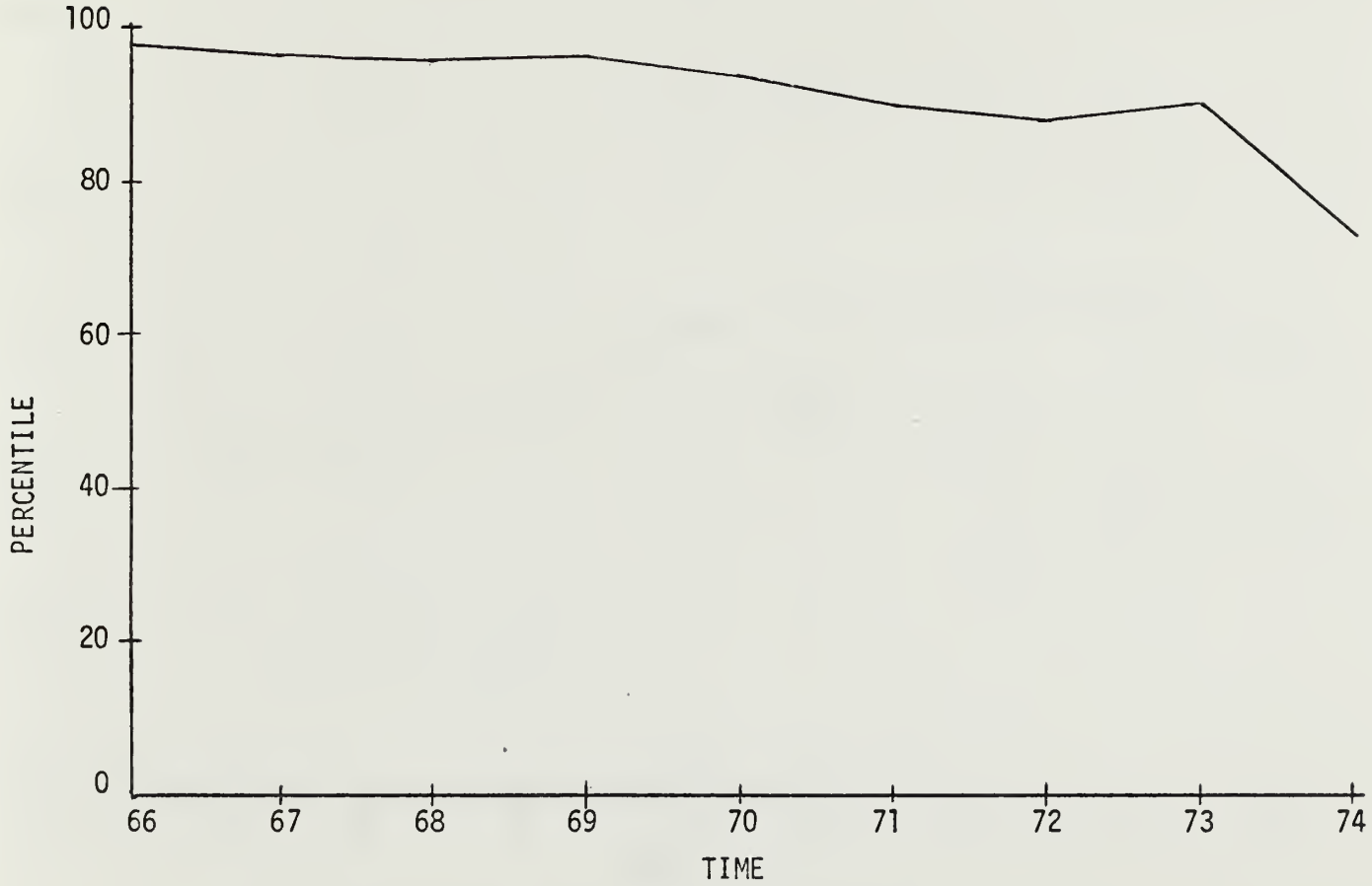

Figure 4. Percentile Indicator x Time

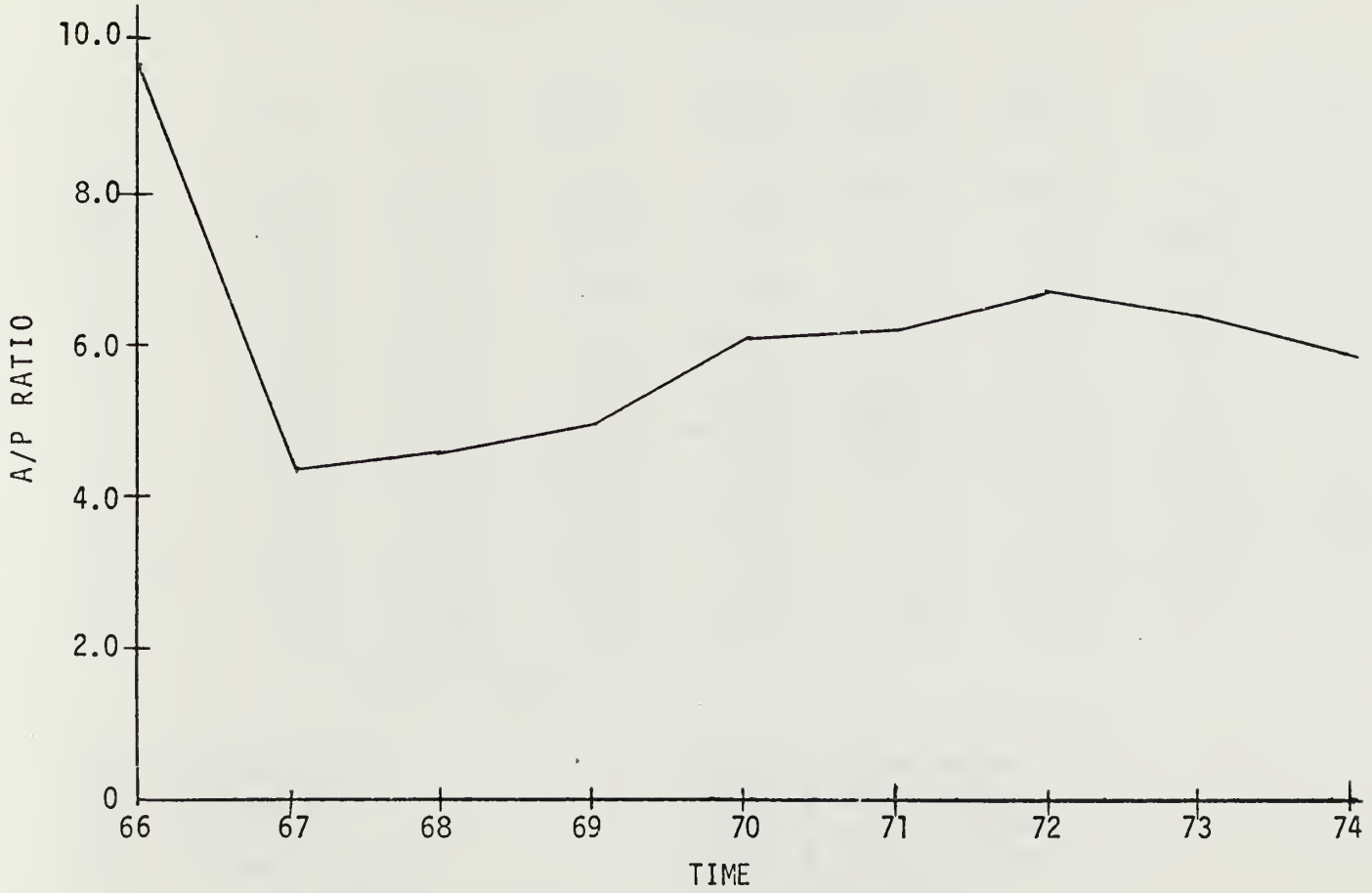

Figure 5. A/P Ratio x Time

TABLE I

Empirical Correlations
1966-1974

	x(2)	x(3)	x(4)	x(5)	x(6)	x(7)	x(8)	x(9)	x(1)	x(10)
x(2)	1.00	*.86	.30	-.51	*.87	*.89	*.72	.14	.53	*-.72
x(3)	*.86	1.00	.53	-.33	*.71	*.77	*.86	-.20	.24	*-.95
x(4)	.30	.53	1.00	.24	.29	.10	*.68	-.18	.12	-.41
x(5)	-.51	-.33	.24	1.00	-.57	*-.72	-.45	-.45	-.62	.22
x(6)	*.87	*.71	.29	-.57	1.00	*.88	*.71	.18	.58	-.52
x(7)	*.89	*.77	.10	*-.72	*.88	1.00	*.73	.30	.54	-.63
x(8)	*.72	*.86	*.68	-.45	*.71	*.73	1.00	.08	.49	*-.72
x(9)	.14	-.20	-.18	-.45	.18	.30	.08	1.00	*.71	.43
x(10)	*-.72	*-.95	-.41	.22	-.52	-.63	*-.72	.43		1.00
x(1)	.53	.24	.12	-.62	.58	.54	.49	*.71	1.00	

x(1) Percentile
x(2) # line pos
x(3) # dir pos
x(4) # staff pos
x(5) # clerical pos
x(6) # line roles
x(7) # dir roles
x(8) # staff roles
x(9) # military pos
x(10) A/P ratio

* Significant for P = .05

TABLE I

(Continued)

1966-1974

	x(2)	x(3)	x(4)	x(5)	x(6)	x(7)	x(8)	x(9)	x(1)	x(10)
x(2)	1.00	*.83	*.91	.45	.57	.56	-.65	*.90	-.28	-.37
x(3)	*.83	1.00	*.97	*.73	*.83	*.74	-.43	*.80	-.39	*-.72
x(4)	*.91	*.97	1.00	.70	*.81	*.71	-.48	*.82	-.28	-.70
x(5)	.45	*.73	.70	1.00	*.98	.62	.14	.42	.11	*-.92
x(6)	.57	*.83	*.81	*.98	1.00	.69	0.00	.54	-.01	*-.92
x(7)	.56	*.74	*.71	.62	*.69	1.00	-.24	.56	-.24	-.60
x(8)	-.65	-.43	-.48	.14	0.00	-.24	1.00	-.49	.11	-.16
x(9)	*.90	*.80	*.82	.42	.54	.56	-.49	1.00	-.48	-.31
x(10)	-.37	*-.72	*-.70	*-.92	*-.92	-.60	-.16	-.31		1.00
x(1)	-.28	-.39	-.28	.11	-.01	-.24	.11	-.48	1.00	

x(1) Percentile
x(2) Civ salaries
x(3) $O&MN
x(4) $HQ OVHD
x(5) $OPN
x(6) Funds available
x(7) # levels
x(8) # groups
x(9) Avg GS level
x(10) A/P ratio

* Significant for P = .05

TABLE I

(Continued)

1966-1974

	x(2)	x(3)	x(4)	x(5)	x(6)	x(1)
x(2)	1.00	.28	-.40	*.75	*-.77	-.64
x(3)	.28	1.00	*-.71	-.09	-.39	-.01
x(4)	-.40	*-.71	1.00	.14	.55	.19
x(5)	*.75	-.09	.14	1.00	*-.71	*-.84
x(6)	*-.77	-.39	.55	*-.71	1.00	*.89
x(1)	-.64	-.01	.19	*-.84	*.89	1.00

x(1) Percentile
x(2) Chief executive span
x(3) A/P ratio
x(4) Size
x(5) Year
x(6) # Roles

* Significant for P = .05

TABLE I

(Continued)

1966-1969

	x(2)	x(3)	x(4)	x(5)	x(6)	x(7)	x(8)	x(9)	x(10)	x(1)
x(2)	1.00	*1.00	.71	-.22	.82	.99	.93	*-1.00	-.99	-.89
x(3)	*1.00	1.00	.75	-.22	.84	.99	.95	-.99	-.99	-.91
x(4)	.71	.75	1.00	-.11	.94	.76	.92	-.66	-.62	-.92
x(5)	-.22	-.22	-.11	1.00	.12	-.10	-.24	.23	.22	.38
x(6)	.82	.84	.94	.12	1.00	.88	.93	-.77	-.75	-.88
x(7)	.99	.99	.76	-.10	.88	1.00	.94	-.98	-.97	-.89
x(8)	.93	.95	.92	-.24	.93	.94	1.00	-.90	-.88	-.99
x(9)	*-1.00	-.99	-.66	.23	-.77	-.98	-.90	1.00	*1.00	.86
x(10)	-.99	-.99	-.62	.22	-.75	-.97	-.88	*1.00	1.00	
x(1)	-.89	-.91	-.92	.38	-.88	-.89	-.99	.86		1.00

x(1) Percentile
x(2) # line pos
x(3) # dir pos
x(4) # staff pos
x(5) # clerical pos
x(6) # line roles
x(7) # dir roles
x(8) # staff roles
x(9) # military pos
x(10) A/P ratio

* Significant for P = .05

TABLE I

(Continued)

1966-1969

	x(2)	x(3)	x(4)	x(5)	x(6)	x(7)	x(8)	x(9)	x(10)	x(1)
x(2)	1.00	.86	.90	.87	.87	.87	0.00	.95	-.68	-.94
x(3)	.86	1.00	.99	1.00	1.00	.98	0.00	.71	-.96	-.93
x(4)	.90	.99	1.00	1.00	1.00	.97	0.00	.77	-.93	-.96
x(5)	.87	1.00	1.00	1.00	1.00	.98	0.00	.72	-.94	-.93
x(6)	.87	1.00	1.00	1.00	1.00	.98	0.00	.72	-.95	-.93
x(7)	.87	.98	.97	.98	.98	1.00	0.00	.69	-.89	-.87
x(8)	0.00	0.01	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
x(9)	.95	.71	.77	.72	.72	.69	0.00	1.00	-.51	-.90
x(10)	-.68	-.96	-.93	-.94	-.95	-.89	0.00	-.51	1.00	
x(1)	-.94	-.93	-.96	-.93	-.93	-.87	0.00	-.90		1.00

x(1) Percentile
x(2) Civ salaries
x(3) $O&MN
x(4) $HQ OVHD
x(5) $OPN
x(6) Funds available
x(7) # levels
x(8) # groups
x(9) Avg GS level
x(10) A/P ratio

No correlations were significant at P = .05

TABLE I

(Continued)

1966-1969

	x(2)	x(3)	x(4)	x(5)	x(6)	x(1)
x(2)	1.00	*1.00	-.90	-.77	-.91	.87
x(3)	*1.00	1.00	-.86	-.71	-.87	.84
x(4)	-.90	-.86	1.00	.97	*1.00	-.96
x(5)	-.77	-.71	.97	1.00	.97	-.91
x(6)	-.91	-.87	*1.00	.97	1.00	-.94
x(1)	.87	.84	-.96	-.91	-.94	1.00

x(1) Percentile
x(2) Chief executive span
x(3) A/P ratio
x(4) Size
x(5) Year
x(6) # roles

* Significant for P = .05

TABLE I

(Continued)

1969-1974

	x(2)	x(3)	x(4)	x(5)	x(6)	x(7)	x(8)	x(9)	x(10)	x(1)
x(2)	1.00	-.34	*.99	-.07	-.08	-.27	-.52	-.63	.06	.65
x(3)	-.34	1.00	-.39	.31	.35	-.39	-.05	.28	.06	.12
x(4)	*.99	-.39	1.00	.05	.03	-.23	-.37	-.72	-.10	.66
x(5)	-.07	.31	.05	1.00	*1.00	.19	.58	-.64	*-.86	.51
x(6)	-.08	.35	.03	*1.00	1.00	.17	.57	-.62	-.85	.51
x(7)	-.27	-.39	-.23	.19	.17	1.00	.16	-.18	-.14	.10
x(8)	-.52	-.05	-.37	.58	.57	.16	1.00	-.09	-.78	-.36
x(9)	-.63	.28	-.72	-.64	-.62	-.18	-.09	1.00	.66	*-.81
x(10)	.06	.06	-.10	-.86	-.85	-.14	-.78	.66	1.00	
x(1)	.65	.12	.66	.51	.51	.10	-.36	-.81		1.00

x(1) Percentile
x(2) # line pos
x(3) # dir pos
x(4) # staff pos
x(5) # clerical pos
x(6) # line roles
x(7) # dir roles
x(8) # staff roles
x(9) # military pos
x(10) A/P ratio

* Significant for P = .05

TABLE I
(Continued)
1969-1974

	x(2)	x(3)	x(4)	x(5)	x(6)	x(7)	x(8)	x(9)	x(10)	x(1)
x(2)	1.00	*.89	.65	-.33	*.91	.83	.62	.56	-.64	.62
x(3)	*.89	1.00	.66	-.58	*.89	*.97	.85	.68	-.86	.61
x(4)	.65	.66	1.00	-.16	.51	.49	.80	*.90	-.22	*.89
x(5)	-.33	-.58	-.16	1.00	-.56	-.63	-.64	-.18	.76	-.44
x(6)	*.91	*.89	.51	-.56	1.00	*.90	.68	.35	-.74	.59
x(7)	.83	*.97	.49	-.63	.90	1.00	.79	.51	*-.92	.47
x(8)	.62	.85	.80	-.64	.68	.79	1.00	.78	-.66	.79
x(9)	.56	.68	*.90	-.18	.35	.51	.78	1.00	-.36	.70
x(10)	-.64	-.86	-.22	.76	-.74	*-.92	-.66	-.36	1.00	
x(1)	.62	.61	*.89	-.44	.59	.47	.79	.70		1.00

x(1) Percentile
x(2) Civ salaries
x(3) $O&MN
x(4) $HQ OVHD
x(5) $OPN
x(6) Funds available
x(7) # levels
x(8) # groups
x(9) Avg GS level
x(10) A/P ratio

*Significant for P = .05

TABLE I

(Continued)

1969-1974

	x(2)	x(3)	x(4)	x(5)	x(6)	x(1)
x(2)	1.00	.42	-.85	.85	-.70	-.54
x(3)	.42	1.00	-.42	.56	-.52	-.26
x(4)	-.85	-.42	1.00	*-.89	*.93	.83
x(5)	.85	.56	*-.89	1.00	*-.94	-.84
x(6)	-.70	-.52	*.93	*-.94	1.00	*.94
x(1)	-.54	-.26	.83	-.84	*.94	1.00

x(1) Percentile
x(2) Chief executive span
x(3) A/P ratio
x(4) Size
x(5) Year
x(6) # roles

* Significant for P = .05

TABLE II

Growth and Decline Data

GROWTH 1966-1969

	66	67	68	69
SIZE	866	1085	1197	1275
PRDI	96.82	96.29	95.75	95.82

DECLINE 1969-1974

	69	70	71	72	73	74
SIZE	1275	1144	1177	1179	1082	966
PRDI	95.82	93.23	89.82	87.63	90.26	74.22

APPENDIX A

REDUCTION IN FORCE

a paper submitted to Dr. Frank Teti
for MN 3101
Personnel Administration and Labor Relations

December 1974

ABSTRACT

Reductions-in-force (RIF) in the federal bureaucracy are discussed in terms of history, Public Law 90-364, control of grade escalation, alternatives to reduction-in-force and Department of Defense responses to RIF.

TABLE OF CONTENTS

INTRODUCTION

Reduction-in-force may be necessary because of conditions inside or outside a federal agency. Management may reduce certain phases of its work as the workload changes. Appropriations may be reduced or cut off entirely, or the agency may be allowed to use only part of its appropriation. These and other factors occurring singly or in combination may make it necessary for the agency to have a reduction-in-force (RIF).

RIF may require the separation of all employees in part of an agency, or may require separation of some and shifting about of others. Small reductions may require no involuntary separations when there are enough transfers, retirements, and other voluntary losses. Some reductions require no reduction in the number of employees because they are accomplished through reorganization.

The agency determines when there is a surplus of employees at a particular location in a particular kind of work. A surplus of employees in any part of an agency requires the agency to determine whether employees will:

1. be assigned to vacant positions
2. be adversely affected for reasons related to performance or conduct
3. compete in a reduction-in-force.

BACKGROUND

Before World War II the reduction-in-force policies and procedures of the federal government were geared to a peacetime situation. In 1945, new reduction-in-force regulations were issued which reflected the reinstatement provisions of the Selective Service and Training Act of 1940. After World War I the morale and administrative efficiency of the career federal service were severely damaged by the unsystematic methods used to reduce the size of the civil service. In anticipation of another series of postwar problems, since 1942, new employees had been granted only temporary "war service" status. This action permitted orderly RIF policies since these employees knew they didn't have permanent status and expected to be laid off at the end of the war. However, many personnel offices acted as outplacement offices, during 1945 and 1946, to ameliorate the effects of the liquidation of war service only jobs. These same policies and procedures were once again used during the Korean War. Plans were made to prevent any sizable increase in permanent status personnel so that once again RIFs could be managed effectively.

RIF plans of this era were based upon the following concepts: competitive area, competitive level, retention groups and subgroups, retention credits and retention rights.

Competitive Area – the part of an agency within a local commuting area within which employees are considered to be in competition within their respective levels.

Competitive Level – all positions in the same grade of the same service, trade or profession, within a competitive area which can be occupied by an interchange of incumbents with minimal training.

Retention Group – personnel are placed in groups based upon tenure of employment. Within each group are four subgroups based upon veterans preference and performance ratings.

Retention Credits – are credits for length of service and performance ratings which are used in determining retention register standing in each retention subgroup.

> Under the federal reduction-in-force program, the personnel office of an agency is notified, by one or more line divisions of the agency, of the number and title of filled positions which are to be abolished. It must be stressed that, under the federal program, initiation of the reduction-in-force process is notification to the agency personnel office in terms of positions to be abolished, not individual employees to be separated. In order to select the individual employees who are to be separated in the reduction-in-force action, competitive areas, and competitive levels are determined by the personnel office, and employees are placed in a retention order in the competitive levels affected. This order is shown for a particular competitive level on a retention register. A retention register is compiled for each competitive level in which a reduction-in-force is to be made, and it shows the names of all employees in competition by retention groups and subgroups. /2.315

Bumping – The process whereby one employee with more retention points displaces another employee. Van Riper /1 states that by 1952 there were 23 RIF categories, bumping

was endemic even for small RIFs and that the costs of implementing a RIF often exceeded the anticipated economies.

During the Eisenhower administration action was taken in 1953 on a Civil Service Commission proposal to rectify the RIF category problem. Retention categories were reduced from 23 to 6 and bumping rights were restricted by geographical area and organizational unit. Retention groups were divided into "career", "career-conditional" and "indefinite" employees and each group was divided into veteran and non-veteran groups. This improvement of RIF procedures reduced the bad effects on employee morale and organizational efficiency produced by the combination of too many categories and unrestricted bumping. The reductions-in-force at the end of the Korean War did not involve as many people as at the end of World War II and the new system worked fairly well.

PUBLIC LAW 90-364

The Revenue and Expenditure Control Act (PL 90-364) was signed into law by President Johnson on Friday, 28 June 1968 which made Section 201, limiting federal civilian employment, effective Monday, 1 July 1968. The law established two categories for personnel limitations: 1 - full-time employees in permanent positions (FTP) and 2 - full-time employees in temporary positions and part-time employees (TPT). The law stipulated that the FTP must decrease gradually to their 30 June 1966 level by filling only three out of four vacancies that occur during any period due to resignation, retirement, removal or dath. The TPT employees are limited by a monthly ceiling that is the same as the on-baord count during the corresponding month of calendar year 1967.

Quick action was taken to implement this law by the Executive Brance because the FY 69 Military Appropriation bills were before Congress and during the hearings DOD could expect queries on the implementation of PL 90-364. A Presidential memorandum of 28 June stressed the necessity for compliance and stated that compliance must not be mechanistic. Within the Department of the Navy, the alternative of restricting all activities to hiring 75% of the number of those separated was considered but not used. The Navy reasoning

was that:

a - 75% hiring would be mechanistic and ignore the discretionary aspects of the law

b - it would ignore budgetary decisions already made

c - it would ignore substantial variations in attrition rates due to local conditions.

The Navy implementation of PL - 90-364 is reflected in the SECNAV instruction issued on 18 July /8. In summary the Navy would:

1 - Predict the required attrition under the 75% rule for the Department.

2 - Adjust the FY 1969 total budgeted end strength by program decisions so that the decrease in personnel strength would approximate the required attrition.

3 - Use quarterly ceilings to approach the adjusted total budgeted end strength gradually.

These restrictions quickly impacted on the various commands within the Navy as evidenced by the NAVORD note /5 which restricted addressees to filling only three out of every four vacancies that occured after 9 August 1968 and indicated that substantially reduced civilian ceilings had been received for 30 September 1968 and even further reduced ceilings for 30 June 1969. The General Accounting Office (GAO) attempted to determine the impact of Section 201 of PL 90-364 upon the Department of Defense and conducted a

survey /4 with the Navy as the primary object. One of the findings of this survey was that the Navy elected to use ceiling control rather than a percentage rehiring authority to implement the law.

CONTROL OF GRADE ESCALATION

The Department of the Navy's average grade rose from 7.13 on 30 June 1968 to 7.81 on 30 June 1971, a rise of 0.68. A review of employment statistics for the Department of the Navy covering the 1968-1971 period shows that, while total graded employment decreased substantially, the decrease was disproportionately large in the lower grades. In fact, the number of employees at GS-8 and above actually increased. This rise in average grade was caused by conversion of contract engineering technicians to civil service status, changes in classification standards by the Civil Service Commission, changes of certain classes of ungraded employees to graded status and possibly some promotions which were a result of outstanding performance although the duties of the position remained substantially unchanged. SECNAV instruction 5310.14 /3 provided a general plan to reverse the escalation of the period 1968-1971. It specified a 0.15 reduction in average grade level for the Navy's General Schedule employees by 30 June 1972 and an additional 0.15 reduction by 30 June 1973. The Naval Material Command experienced a representative growth for this period in that the average grade rose from 7.92 to 8.55, a rise of 0.63. In response to the SECNAV guidance the Chief of Naval Material specified in NAVMAT instruction 5310.6 /9 a 0.171 command wide reduction. The

formula was believed to be equitable because there had been approximately equal escalation in all components of the command and because it was deemed unfair to unduly penalize organizations with higher average grades since differences in grade levels reflected differences in function and responsibility. A key element in the Chief of Naval Material plan was that reductions-in-force were not to be conducted solely for the purpose of reducing average grade and that under circumstances where RIFs were required they were to be structured to contribute as much as possible to average grade reduction. This type of command guidance in reducing grade level seems very calm and organized but the realities faced by components in the Naval Material Command were often harsher. RADM Baughan, Vice Commander, Naval Ordnance Systems Command commented in September 1971:

> "When I arrived in NAVORD a year ago in August, a RIF was in progress – caused by a percentage cut in billets throughout headquarters Navy. The cut involved both military and civilian personnel as well as a cut in the O & MN dollars that pay salaries. The percentage was not equally distributed so the Navy Material Command took a higher share. Concurrently, we faced, in NAVORD, a sizeable internal reorganization to combine all the weapon system directorates into one major acquisition directorate. You can imagine the personnel anguish! It was traumatic for everyone involved. And it came right on top of a move from Main Navy to a new building." /11,24

The pressure to reduce average grade level has continued with emphasis on intensified application of position management techniques and development and implementation of plans

to reduce average grade. Plans to implement reduction in average grade through position management are based upon:

1 - Careful review of all programs to determine which low priority activities can be reduced or eliminated.

2 - Review of the organizational structure of each unit to determine if approved staffing patterns are still appropriate in view of program changes.

3 - Review of supervisory levels, with particular attention to the extent of layering and the need for deputies or assistants. Particular attention is directed to those situations where a military supervisor is supported by a full-time civilian assistant.

4 - Evaluation of each position that becomes vacant to determine whether it can be eliminated or restructured at a lower grade.

5 - Vacancies which are supported by a Position Management Review are to be filled at the entry level except where serious impact on mission will result from this action.

6 - Planning of the staffing of new programs in a manner that will tend to lower the average grade. If any new position is justified by a Position Management Review, first consideration for filling the position should be by reassignment of an

employee who is at the same grade level as that of the new position.

7 - Vacancies are to be filled by promotion only after

a - Reviewing the position to determine whether it can be modified to fill at the entry level or some lower level below the current grade; if not

b - Determining that the duties cannot be assumed by other existing positions; if not

c - Determining whether the position can be filled by the lateral reassignment of an employee, preferably one whose position can be restructured to a lower grade or eliminated.

8 - Exploration of the feasibility of using technicians where professional staff is not being utilized at full skill level.

9 - Consideration of the opportunity of eliminating certain positions through increases in productivity.

10 - Outstanding performance should be rewarded through approved procedures such as quality salary increase and case award rather than by promotion.

11 - Reorganization of work or re-engineering of positions so that the work can be accomplished with lower grade employees.

12 - Reductions-in-force will not be conducted solely to reduce average grade. Where required for other reasons, RIFs should be structured to contribute as much as possible to reduction of grade, specifically, positions selected for elimination should be at upper as well as lower grade levels.

In spite of the excellence of these plans reductions-in-force have occurred in the period 1968-1974. The yearly issue of notices and instructions, by all levels in the Department of Defense, concerning control of grade escalation in the General Schedule bears mute testimony to the extreme difficulty of controlling the size and average grade level of the federal workforce. RIFs can be caused by lack of work or funds or the need to make room for an employee with reemployment or restoration rights in addition to those resulting from reorganizations or downward reclassification, however, the majority have been the result of conscious efforts to reduce the federal payroll.

ALTERNATIVES TO RIF

RIFs are a highly sensitive area of employee-management relations and should be viewed as part of the overall personnel management concern of the agency. Mere literal adherence to the regulatory and procedural requirements of RIF alone doesn't make a sound management approach. People are hurt in a RIF and this increases anxiety and adversely affects morale. Planning is probably that aspect of RIF most often neglected. Management must consider the personal impact of the reduction and give the personnel management staff sufficient lead time for advance planning. Proper planning can lessen the potential effect of the RIF, prepare employees for the RIF and forestall administrative problems caused by hasty action. Federal agencies have worked out a variety of solutions to the RIF problem:

1 - Obtaining special authority from the Civil Service Commission to extend temporary appointments.

2 - Detailing employees on a reimbursable basis to other agencies.

3 - Meeting individually with employees eligible for optional or involuntary retirement to explain its benefits.

4 - Placing employees who desire it on leave without pay until the beginning of the next fiscal year.

5 - Making maximum use of waives of qualifications in assignments in RIF.

6 - Using furlough to defer lump-sum payments until the next quarter of the fiscal year, when deferment may permit recall of the furloughed employees.

7 - Assigning career employees out of a unit for which RIF is planned, and into vacant continuing jobs and hiring temporary employees to do the needed work until the RIF occurs.

8 - When a backlog of work develops in one division of an agency, personnel can be shifted from other divisions to meet the backlog and the need to hire new employees is avoided.

9 - Using extensive overtime, rather than hiring new employees to avoid a RIF when the workload decreases.

10 - Maintaining strict control over leave, to maintain a minimum workforce, but one sufficient to meet peak workloads.

11 - Giving advance notice to major field activities when it is apparent that funds will be smaller than programmed and advising field managers to make maximum use of attrition and to minimize hiring until a firm funding program is received.

12 - Analyzing continuing positions to identify those for which a shortage of applicants exists and taking steps to train employees facing possible RIF.

13 - Requesting that the Civil Service Commission determine that the agency is undergoing a major

RIF, for the purpose of authorizing early voluntary retirements.

14 - In the Department of the Navy, use of the Cross Series Management Development Program which allows for reassignment of an individual in any one of a number of occupational series for which normally he would not qualify.

15 - Identification within an agency of high priority vacancies for placement of surplus personnel.

The variety of strategies and tactics presented above gives an indication of the organizational alternatives to an across-the-board strategy of either percentage hiring or percentage lay-offs. These alternatives are meant to be representative rather than all-inclusive. Other tactics have been and will be used.

When positive action is taken to avoid a RIF several benefits accrue to the organization. Employee skills and knowledge are retained that otherwise would have been lost. Additional skills are developed in the case of employees reassigned under lateral development agreements. The chain bumping reaction result of a RIF is avoided. The disruption of employee morale and efficiency attendant to advance notices of RIF is also avoided. The agency can often gain an improvement in morale resulting from the demonstration of managements' concern. If a RIF is avoided or its effects lessened by filling vacancies at the entry level, the command can expect

a heavy impact on reduction of average grade and introduction of young employees into an aging workforce. In addition, the smooth flow of work in the organization continues, the economy of a community is not shaken and individuals and families are not put on relief.

DOD RESPONSES TO RIF

DOD Directive 1400.20 /16 specifies that:

> "Firm measures will continue to be taken to promote stability of employment for career employees whose positions are affected by shifting DOD manpower requirements and to provide maximum opportunity for DOD-wide placements through automated referral procedures. To minimize the adverse effect on individuals affected by base closures, consolidations, transfer of functions, and reductions that result from the technological and organizational changes necessary to keep the DOD establishment up to date, a strong program will be conducted.

The DOD Program for Stability of Civilian Employment includes:

1 - advance planning and notice to employees

2 - priority referral and placement within DOD

3 - retraining of employees

4 - payment of transportation and moving expenses to a new DOD job

5 - income protection

6 - severance payments

These elements are explained in three manuals in the DOD 1400.20 series /17, /18, /19 covering policies, procedures, programs, counseling and inspection guidelines. The comprehensiveness of these procedures can be grasped when it is realized that these three manuals are more than one and three quarters inches thick and that they only represent the DOD interpretation of the Federal Personnel Manual.

The Reduction In Force Information Pamphlet /15 is intended for the individual employee faced with a RIF and is intended

as a check-list rather than as a compendium of all the information he needs. Through this pamphlet he is acquainted with placement assistance through the DOD Priority Placement Program, the CSC Displaced Employee Program and the Local Placement Program and he is also made aware of provisions for relocation allowances. The employee is also given a brief description of his eligibility for discontinued service retirement, deferred retirement and the refund of retirement deductions. Further consideration is given to annual leave, sick leave, final salary check, salary retention, severance pay, unemployment compensation, the Federal Employee Group Life Insurance Program, the Federal Employee Health Benefits Program and last but not least a discussion of what may be appealed and appeal procedures. The employee is invited to get counseling from his Civilian Personnel Office representative and to get a copy of FED FACTS 13 on reduction-in-force in federal agencies.

As can be seen the Department of Defense Program for Stability of Civilian Employment along with the program for Control of Grade Escalation in the General Schedule is a massive Executive Branch response to the problem of reduction-in-force. The sheer mass of regulations and programs, however, clouds the picture and hides the often conflicting strategies represented in this area of personnel administration.

CONCLUSIONS

Reductions-in-force are a normal organizational response to either external or internal events. Prior to World War II most RIFs were agency responses to shifting workloads and employee retention/reinstatement rights. Since World War II, RIFs have been responses to Congressional requirements to diminish the size and lessen the payroll of the federal workforce. Public Law 90-364, unfortunately, was a Congressional afterthought rather than the result of a well prepared, reasoned approach to control of the federal bureaucracy. It appears that constituent reaction to RIFs and their economic impact on individuals and communities has tempered Congressional zeal to the point where the Executive Branch is able to respond with a multitude of plans for reduction and plans to reduce the growth that occurred while the planned reduction was in progress. My discussion with Mr. Richard Selby, Office of the Assistant Secretary of Defense (Manpower and Reserve Affairs) in November 1974 indicated that substantial progress had been made between 1964 and 1974 since less people were working for the government in 1974 than in 1964. This represented a true reduction-in-force of approximately 20%. This reduction has, unfortunately, not been accompanied by an equally substantial reduction in average grade level. Chapter 35, Title 5, United States Code states:

> "The Civil Service Commission shall prescribe regulations for the release of competing

> employees in a reduction in force which give due effect to —
>
> 1 - tenure of employment
> 2 - military preference
> 3 - length of service; and
> 4 - efficiency or performance ratings.
>
> A preference eligible employee whose efficiency or performance rating is "good" or "satisfactory" or better than "good" or "satisfactory" is entitled to be retained in preference to other competing employees .... "

With the full force of the United States Code behind it, the seniority system of tenured employees almost guarantees ineffective any plan to reduce both the size and the average grade level of employees in the General Schedule. It would appear that unless present laws and regulations are changed, that the federal civil service will increasingly consist of aging, tenured senior grade level employees who represent the remnants of a once healthy civil service decimated by unplanned RIFs, unsuccessful grade escalation control and increasing ad hocracy in the management of reduction-in-force.

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APPENDIX B

Data on the Organization

	1966	1967	1968	1969	1970	1971	1972	1973	1974
#Paid Salaries	825	1052	1233	1301	1182	1171	1121	992	907
Size	866	1085	1197	1275	1144	1177	1179	1082	996
#Line mgt pos	105	165	168	167	106	134	124	120	102
#Direct pos	82	205	217	217	162	166	153	147	146
#Staff pos	521	560	676	728	704	695	698	636	571
#Clerical pos	166	166	148	172	179	195	209	183	191
#Roles	147	164	170	177	154	146	141	140	109
#Line roles	25	30	32	37	23	24	25	27	22
#Direct roles	28	41	41	43	27	26	25	24	26
#Staff roles	122	133	140	141	137	129	129	127	124
%Line mgt pos	12	14	14	13	9	11	10	11	10
%Direct pos	9	19	18	17	14	14	13	13	14
%Staff pos	60	52	56	57	61	59	59	59	57
%Clerical pos	19	15	12	13	16	16	18	17	19
Ch. exec span	22	21	21	21	22	22	22	25	24
#Levels	10	12	12	13	11	13	13	12	12
#Groups	10	10	10	10	9	9	9	9	10
#Officers	190	142	140	143	140	141	124	96	96
#Enlisted	0	0	2	2	1	2	2	2	2

APPENDIX B (Continued)

	1966	1967	1968	1969	1970	1971	1972	1973	1974
Avg GS level			10.48	10.47	10.71	10.76	11.05	11.10	11.24
Civ salaries	1179	14272	19063	21175	23800	21854	21531	19956	19186
$O&MN		205167	232342	265136	264726	252304	261976	280347	262938
$OPN		719325	822499	974349	563033	469179	480737	625800	522600
$HQ OVHD		15891	20815	22761	25345	23028	22374	20415	20005
Funds avail.		926111	1056593	1241071	829304	722657	743556	906606	786357
Implicit deflator	.74	.76	.79	.83	.88	.92	.95	1.00	1.00
A/P ratio	9.66	4.35	4.57	4.92	6.10	6.17	6.74	6.39	5.92
Percentile indicator	96.82	96.29	95.75	95.82	93.23	89.82	87.63	90.26	74.22

NOTES:

1. #Roles ≠ #line + #direct + #staff roles
   because the tally method introduced double counting in the sub-categories.
2. Funds available = O&MN + HQ OVHD + OPN - civilian salaries.
3. All dollar amounts are expressed in constant 1973 dollars.
4. Implicit GNP deflators from Economic Report of the President 1974.

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